



Application Note

Configuration of S7-300 with CPU315-2 DP and a Multiturn Encoder 9080/5860 as a PROFIBUS-DP Master

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1 Introduction

This manual describes the configuration of an S7-300 PLC with CPU 315-2) DP for PROFIBUS-DP Master to connect to a <u>Kübler PROFIBUS-DP</u> Slave. The example describes the configuration for four bytes input and four bytes output.

2 Hints and Validity

- This manual describes the S7-300 as Master on PROFIBUS-DP
- STEP7 Version 3.1 under Windows 95 > (already installed)
- This manual describes the configuration for a data exchange only. The PLC programer is responsible for the error handling. This is not part of this manual.

3 Steps

3.1 Project

The first step is to create a project. To create a project select menu **File -New - Project**. Enter the name for the project, e.g. S7DPM

🚔 S7DPM - <standard hierarchy<="" th=""><th>, Offline> (Project) C:\SIEMENS\STEP7\S7proj\S7DPM</th><th>_ 🗆 ×</th></standard>	, Offline> (Project) C:\SIEMENS\STEP7\S7proj\S7DPM	_ 🗆 ×
S7DPM	변화 변화 MPI(1)	

3.2 Stations

This manual describes the configuration for a PRODIBUS-DP master a S7-300 and a (Kübler PROFIBUS-DP) slave. The next steps are to insert these two stations.

3.2.1 S7-300 Station

To insert the S7-300 station select menu **Insert - Station - SIMATIC 300 Station**.

🎒 S7DPM - <standard hierarchy<="" th=""><th>, Offline> (Project) -</th><th>- C:\SIEMENS\STEP7\S7proj\S7DPM</th><th>- 🗆 ×</th></standard>	, Offline> (Project) -	- C:\SIEMENS\STEP7\S7proj\S7DPM	- 🗆 ×
STDPM SIMATIC 300 Station (1)	SIMATIC 300 Station (1)	MPI(1)	

3.2.2 Kübler Multiturn Encoder PROFIBUS-DP Slave

Later you will need the GSD file for the Kübler PROFIBUS-DP slave device. The following table shows the device and its corresponding GSD file name.

Device	GSD file name	Slave type		
Multiturn Encoder 9080	KUEB9080.GSD	Modular slave		
Multiturn Encoder 5860	KUEB06AE.GSD	Modular slave		

These files are on the Kübler CD-ROM named ProfibusDP Software or on the homepage of the PNO at <u>www.profibus.com</u> or on www.kuebler.com

3.3 Hardware Configuration S7 300 Station

Open the software for hardware configuration of the S7 station.

🎒 S7DPM - <standard hierarchy<="" th=""><th>, Offline> (Project) C:\SIEMENS\STEP7\S7proj\S7DPM</th><th>_ 🗆 🗵</th></standard>	, Offline> (Project) C:\SIEMENS\STEP7\S7proj\S7DPM	_ 🗆 🗵
■ ♣ S7DPM SIMATIC 300 Station (1)	Hardware	

Select the icon Hardware. Then select the menu **Edit - Open Object** or double click the Hardware icon to start the Hardware Configurator.

Select the menu View - Catalog.



Select now step by step the hardware components of the S7 300 station.

Hardware Configuration: S7DPM\SIMATIC 300 Station (1) *	Hardware Catalog Select Hardware SiMATIC 300 C7-620 CP-300	× • •

3.3.1 The Rail

3.3.2 The Power Supply



3.3.3 The CPU

Select for example CPU 315-2DP.

	CPU313	
	📓 CPU314	
	📓 CPU314	
	📓 CPU314 IFM	
	🛛 📓 CPU314IFM	
	🚺 CPU315	
	🚺 CPU315	
	🔤 🔣 CPU315-2 DP	
	🚺 CPU388-4	
	- 📕 CPU614	
ES73	15-2AF01-0AB0	
Nork M	lemory 48KB; 0.3ms/kAW;	

Because this CPU type is usable for PROFIBUS-DP the following window appears. Set the node is connected to the selected network to active.

erties - PROFIBUS Nodes	
neral Network Connection	
The node is connected to the selected n	etwork
PROFIBUS	
Address: 2	
Subnet	
PROFIBUS:	
	Nou
	<u><u>n</u>ew</u>
	<u>Properties</u>
	Properties
	Properties

Set the PROFIBUS address, e.g address 2.

Properties - PROFI	aus 🗙
General Network	ettings
<u>N</u> ame:	PROFIBUS-DP
Project Path:	S7DPM
<u>A</u> uthor:	
Date Created:	23.02.1999 19:29:09
Last Modified:	23.02.1999 19:29:09
<u>C</u> omment:	
OK	Abbrechen Hilfe

Create a subnet by pressing the button New.

Select Network Settings to open the following window.

Properties - PROFIBUS		×
General Network Setting	5	1 ⁹⁷
		No. of Nodes
Highest <u>M</u> PI Address:	126 🔽 🗖 Change	<u>C</u> onfigure
<u>T</u> ransmission Rate:	19.2 Kbps 93.75 Kbps 187.5 Kbps 500 Kbps 1.5 Mbps 3 Mbps ▼	
<u>P</u> rofile:	Distributed I/O Standard Universal (DP/FMS) User-Defined	<u>B</u> us Parameters
OK		Abbrechen Hilfe

Select the transmission rate, e.g. 1.5 Mbps.

SUII S

Select the Profile, e.g. the Distributed I/O profile.)

								Ŭ	
📲 HW	Confi	g - Har	dware	: Confi	iguration:	S7DPM	\SIMAT	IC 300	Station (1) *
<u>S</u> tation	<u>E</u> dit	<u>I</u> nsert	<u>P</u> LC	⊻iew	<u>O</u> ptions	<u>₩</u> indow	<u>H</u> elp		
			3		1	1	N?		

Press several times OK to reach the following window.

👬 Hardware Configuration: S7DPM\SIMATIC 300 Station (1) * 💶 🗖 🗙 🚍 (0) UR DP Master System (1) PS307 2A 1 ٠ 2 SCPU315-2 DP 21 DP-Master 3 4 5 6 7 8 9 10 Press F1 for help.

Save the current setting by selecting the menu Station - Save.

_ 🗆 ×

3.3.4 Add GSD

Open the Explorer and copy the GSD file (KUEB9080.GSD or) KUEB06AE.GSD into the directory of C:\Siemens\Step7\S7data\GSD.

Then select the menu Options - Update DDB Files.

In the hardware catalogue you will find the Kübler PRODIBUS-DP slave now under section (Additional Field Devices.)



3.3.5 Insert PROFIBUS-DP Slave Device

Now select the line of **DP Master System**(1) by a click with the left mouse button on it! The line will become a **solid** line.

📲 HW Config - Hardware Config	uration: S7DPM\SIMATIC 300 Station (1)	_ 🗆 ×
<u>Station</u> <u>E</u> dit Insert <u>P</u> LC <u>V</u> iew (<u>O</u> ptions <u>W</u> indow <u>H</u> elp	
	💼 🛍 📳 🕺	
Hardware Configuration: S7	7DPM\SIMATIC 300 Station (1)	
	DP Master System (1)	
Press F1 for help.		

Select the folder of

- Kübler Multiturn Encoder 9080
- Kübler Multiturn Encoder 5860

and drop it on the solid **DP Master System** (1) line.

A window is opened to set the station address of this slave.

Properties - PROFIBUS Nodes			×
General Network Connection			<u> </u>
PROFIBUS	lected network.		
Address:			
- <u>S</u> ubnet PROFIBUS:			
PROFIBUS-DP	1.5 Mbps	Nev	M
		Proper	rties
A			
OK		Abbrechen	Hilfe

Press OK to open the following window.

Bestellnummer: Familie:	8.9080.xxxx.xxxx Encoder	GSD-Datei (Typdatei): KUEB9080.GSD
DP-Slave-Typ: Bezeichnung:	Multiturn Encoder 9080 PF	ROFIBUS
2020IO INGING.	JMultiturn Encoder 9080 P	
Adressen		Teilnehmer/Mastersystem
Diagnose <u>a</u> dresse:	1022	PROFIBUS 3
		DP-Mastersystem (1)
SYNC/FREEZE-F	ähigkeiten	
☑ <u>S</u> YNC-fähig	💌 EREEZE-fähig	Ansprechüber <u>w</u> achung
ommentar:		
		4

Press the OK button.



The PROFIBUS-DP slave appears on the DP master system.

3.3.6 Assigning addresses of input and output

Open the folder of the device in the hardware catalogue.

/A Iyp:	Aus-Eingar	ng 💌	1		Dire <u>k</u> teingabe
Ausgang	,		-		
<u>A</u> dresse:	Länge:	Einheit		Konsistent über:	
Anfang: 256	2 🛨	Worte	7	gesamte Länge 💌]
Ende: 259					
Teilprozeßabbild:			v		
Eingang					
A <u>d</u> resse:	Länge:	Ejnheit:		Konsistent über:	
Anfang: 256	2 🚊	Worte	7	gesamte Länge 💌]
Ende: 259					
Teilprozeßab <u>b</u> ild:			Ŧ		
Herstellerspezifische	Daten:			(dame de stand
				durch Komma or	e nexadezimal, der Leerzeichen
l.				getrennt)	

Select first the module **4 byte input (256).** The following windows appears.

Set the start address of the 4 byte input and press OK.

This address is very important for the PLC program.

.		
Parameter	Wert	
- Stationsparameter		
	Increasing clockwise (0)	
E Class 2 functionality	Disable	
_≣] Scaling function control	Disable	
Measuring units/revolution 13bit	8192	
└└──└── User Prm Data (0 bis 5)	00,00,00,00,20,00	
	Abbrechen	Hilfe
OK nschaften - DP-Slave resse / Kennung Parametrieren	Abbrechen	Hilfe
OK nschaften - DP-Slave resse / Kennung Parametrieren Parameter	Abbrechen	Hilfe
OK nschaften - DP-Slave resse / Kennung Parametrieren Parameter Gim Gata Stationsparameter	Abbrechen	Hilfe
OK nschaften - DP-Slave Iresse / Kennung Parametrieren Parameter □ ➡ Stationsparameter ↓ ➡ Gerätespezifische Parameter	Abbrechen	Hilfe
OK nschaften - DP-Slave Iresse / Kennung Parametrieren Parameter Parameter Garätespezifische Parameter Garätespezifische Parameter Garätespezifische Parameter Garätespezifische Parameter Garätespezifische Parameter	Abbrechen Wert Increasing clockwise (0)	Hilfe
OK	Abbrechen Wert Increasing clockwise (0) Enable	Hilfe
OK	Abbrechen Wert Increasing clockwise (0) Enable Enable	Hilfe
OK	Abbrechen Wert Increasing clockwise (0) Enable Enable 2048	Hilfe
OK	Abbrechen Wert Increasing clockwise (0) Enable Enable 2048 00,04,00,00,08,00	Hilfe

Select first the module and then change the parameter e.g. scaling)

Copyright© Kübler GmbH

PS 307 2A CPU 315-2 DP 7 Px8tue-OF	PROFIBUS(1) DP Masteugatem(1)	_
A A	ESMARAT PHONE Stateware hal alog	zi
	Profit Standard	-
[3] HubburnEncoder 9980 P Apletz Bestelnonmer 20X Class 2 Moliform	E-Adieste A-dobetae Kommer E-Adieste A-dobetae Kommer DP13 295, 259 255, 259	us
	Brigg Steway Brigg Steway Brigg SPS	

(That module result in the value 256 ... 259.)

3.3.7 Download the hardware configuration

Select the menu PLC - Download.

Select Target Module			×
<u>T</u> arget Modules:			
Module	Rack	Slot	
CPU315-2 DP(1)	0	2	
Coloot All			
Select All			
UK	Cano		Help

Select All and press OK.

Define Node Address	×
From which node addre DP(1) be reached?	ss can the module CPU315-2
<u>R</u> ack:	0
<u>S</u> lot:	2 -
<u>N</u> ode Address: (MPI)	2
ОК	Cancel Help

Press OK. The Download Window shows Module currently beeing processed [0/0/2/0] CPU 315-2DP(1)

3.3.8 Save and Exit the Hardware Configurator

Select menu Station - Save and the select the menu Station - Exit.

3.4 Data Blocks

The data block contains the values that are read and write over the PROFIBUS. First the data blocks have to be created.

🎒 S7DPM - <standard hierarchy<="" th=""><th>, Offline> (Project)</th><th>) C:\SIEMENS\STEI</th><th>P7\S7proj\S7DPM</th><th>_ 🗆 ×</th></standard>	, Offline> (Project)) C:\SIEMENS\STEI	P7\S7proj\S7DPM	_ 🗆 ×
E STDPM E SIMATIC 300 Station (1) E ST CPU315-2 DP(1) E ST Program(1) E Source Files Elocks	System Data	OB1		

Select **Insert -S7 Block - Data Block**. Enter the number of the data block, e.g. DB1.

Eigenschaften - Datenb	oaustein		×
Allgemein - Teil 1 Allgeme	in - Teil 2 Aufrufe Attribute		
Name und Typ:	DB1 Global-DB	_	
Symbolischer Name:	Position		
Symbol <u>k</u> ommentar:			
<u>E</u> rstellsprache:	DB		
Projektpfad:			
Speicherort des Projekts:	C:\Siemens\Step7\S7proj\S7_90	080	
Erstellt am:	Code 24.06.2002 10:36:04	Schnittstelle	
Zuletzt geändert am:	24.06.2002 10:36:04	24.06.2002 10:36:04	
K <u>o</u> mmentar:			×
ОК		Abbrechen	lilfe

Press OK.

Now the dat block appears in the block container.

🚔 S7DPM - <standard hierarchy<="" th=""><th>, Offline> (Project)</th><th>- C:\SIEMENS\</th><th>STEP7\S7proj\S7DPM</th><th>_ 🗆 ×</th></standard>	, Offline> (Project)	- C:\SIEMENS\	STEP7\S7proj\S7DPM	_ 🗆 ×
S7DPM SIMATIC 300 Station (1) SIMATIC 300 Station (1) CPU315-2 DP(1) S7 Program(1) Source Files Blocks	System Data	DB100	OB1	

Select DB1) and then select the menu **Edit - Open Object** or double click the icon of DB1.

The software LAD/STL/FBD starts.

New Data Block		х
Block: <u>P</u> rogramming Tool:	DB100	
Create © <u>D</u> ata Block		
🔿 Data Block Refe	erencing a <u>U</u> ser-Defined Data Type	
C Data Block Refe	erencing a <u>F</u> unction Block	
<u>R</u> eference:		
ОК	Cancel Help	

Press OK.

KOP/AN	VL/FUP - [DB1 -	- 57_9080\SIMAT	IC 300(1)\CPU 3	15-2 DP]		- 🗆 X
🖸 Datei 🛛	Bearbeiten Einfi	igen Zelsystem I	est Ansicht Egt	tras <u>F</u> enster <u>H</u> ilfe		_ # ×
			9 11 10	<u>14 21 19</u>		
hiresse	Bane	Typ	Rufangsvert	Komentar		Ĵ.
0.0		STRUCT				
+0.0	Position	DUORD	D001690	Multiturn Encoder Position 32 Bit		
-4.0	S.	END_STRUCT	1			
Datel/Baustein	gespeichert.				© offine	Abs Elnig A

Enter name, type and initial value of DB1.

Select the menu File - Save.

Insert from the Library StdLib30 all OB necessary for your project, e.g. OB86.

Open OB1 and add the following program instructions.

Kad/STL	/FBD - [\$7	OPM\SIMA	TIC 300 Station (1)\	CPU315-2 D	P(1)\\OB1 - <offlir< th=""><th>ne>]</th><th>_ 🗆 X</th></offlir<>	ne>]	_ 🗆 X
🕒 <u>F</u> ile <u>E</u> dit	<u>I</u> nsert <u>P</u> LC	: <u>D</u> ebug ⊻	(iew <u>O</u> ptions <u>W</u> indov	w <u>H</u> elp			_ 8 ×
	B 10	X 🖻 🛍	6% 🚵 !≪ ≫!	₩.) → ♪	N?	
Address	Decl.	Nam	e T	уре	Initial	Valu Comme	nt 📑
Network	1:???						_
333							
L	DB1	JO.DBW	0				
Т	PAW	0					
Г	PEW	Ο					
Г	DB10	D1.DBW	0				
]		•
Press F1 for he	lp.				OFFLINE	SIM Insert	1:6 Modified //

Select File - Save and File - Exit.

Select the menu PLC - Download.

3.5 Monitor/Modify Variables

Select the menu **View - Online**. Then select CPU 315-2DP. Then select the menu **PLC - Monitor/Modify Variables**.

🔚 Monitoring and Modifying Variables - Variable Table1								_		
	<u>I</u> able <u>E</u> dit <u>I</u> nsert <u>P</u> LC Varia <u>b</u> le <u>V</u> iew <u>O</u> ptions <u>W</u> indow <u>H</u> elp									
	▶☞■● ◇ ४ ६ ६ /∿									
Variable Table1								x		
	Address		Symbol	Monitor	Format	Monitor	Value	Modify	Value	
	DB100.DBW	0		HEX						
	DB101.DBW	0		HEX						
	,									
10.	S7DPM\SIMATIC 300 Station (1)\CPU315-2 DP(1) INS Online Edit [271 //									

Add the variables.

Go online and monitor/modify values.